



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/060,483	01/30/2002	Yen-Ming Chen	TS01-413	6922

28112 7590 09/08/2003

GEORGE O. SAILE & ASSOCIATES
28 DAVIS AVENUE
POUGHKEEPSIE, NY 12603

EXAMINER

TRINH, HOA B

ART UNIT PAPER NUMBER

2814

DATE MAILED: 09/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/060,483

Applicant(s)

CHEN ET AL.

Examiner

Vikki H Trinh

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:
The title of the should be "Method for Making Bump Reliability for Flip Chip Device".
Appropriate correction is required.

Claim Objections

2. Claims 1 and 15 are objected to because of the following informalities: In line 1 of each of the claim, the term "improve" is redundant, because a patent application in general is directed to a new or improve method/device. Appropriate correction is required.
3. Claim 1 is objected to because of the following informalities: in line 3, "one a" should be "one". Appropriate correction is required.
4. Claims 12, 26 objected to because of the following informalities: in each of the claim, the statement regarding to the number of patterns is confusing. In particular, line 2 states that the mask comprises at least one pattern, then lines 4-7 state a first pattern and a second pattern. Do applicants intend to claim that the photoresist layer has two sub-layers? Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. Claim 7 is recites the limitation "said semiconductor surface" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.
6. Claims 12, 24 each recite the limitation "said second pattern" in line 5 of each claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

8. Claims 1-11, 13-25, 27-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Huang (6,452,270).

As to claims 1, 10, 15, 24, Huang (6,452,270) discloses the steps of making the solder bump in flip chip device. The steps include:
providing a substrate 310, at least one contact pad 320 over the substrate, a layer of passivation 330 over the substrate patterned and etched to expose a surface of the contact pad, a layer of UBM 340 over the passivation layer and the exposed surface of the contact pad;

Art Unit: 2814

making a T-shaped layer of solder over the surface of the UBM in at least an opening created in a layer of patterning material/photoresist, the solder aligned with the contact pad;

removing the patterning material leaving in place the bump and exposing the surface of the patterned layers UBM;

etching the exposed layer of UBM using the at least one T-shaped layer of solder as a mask; and

reflowing the surface of the solder, creating the solder bump.

See col. 3, lines 38-65, col. 4, lines 1-45, and figures 3-7.

As to claims 2, 11, 16, 25, the patterning material is photoresist with inherent grey-toned against the substrate. See col. 4, line 40.

As to claims 3-4, 17-18, Huang (6,452,270) teaches that the UBM has three layers which may be made of materials such as Chromium, gold, and copper. See figure 7 and col. 1, lines 45-47, 58-59.

As to claim 5, 19, Huang (6,452,270) teaches a passivation layer comprising a plurality of passivation layers. See col. 3, lines 44-46.

As to claims 6, 20, at least one of the passivation layers is polyimide, silicon dioxide. See col. 3, lines 44-46.

As to claims 7, 21, the contact pad on the semiconductor surface being electrically connected with a semiconductor device with at least one conductive point. See figure 7.

Art Unit: 2814

As to claims 8, 22, the contact pad being expanded to include a contact pad that is formed on a surface of a semiconductor device mounting support and flex circuit. See col. 1, lines 30-42.

As to claims 9, 23 it is inherent that the step of solder flux is performed prior to the reflowing step. See col. 4, lines 39-45.

As to claims 13, 27, a step of sputter clean inside the surface of the at least one opening. See col. 4, line 36.

As to claims 14, 28, depositing a seed layer 340d over the inside surfaces of the at least one opening having a T-shape. See figure 7.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 12 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang.

Art Unit: 2814

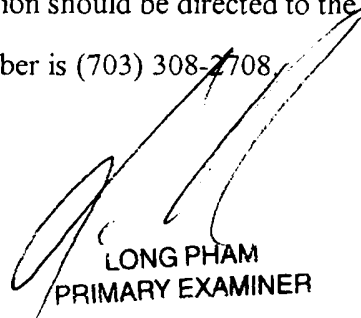
Huang discloses the invention substantially as claimed. However, Huang does not explicitly teach that the mask layer has two sub-layers. Nonetheless, it would have been obvious to one skilled in the art at the time the invention was made to make a single layer into a plurality of layers of the same material, as claimed.

It is well established that the mere repetition or duplication of a part is prima facie obvious absent a disclosure that the process is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical. See, for example, *In re Ockert*, 114 USPQ 330 (CCPA 1957); *In re Schuelke*, 96 USPQ 421 (CCPA 1953); *In re Hertrich*, 73 USPQ 442 (CCPA 1947); *Long Mfg. N.C., Inc. v. Condec Corp.*, 223 USPQ 1213 (DC ENC 1984); *St. Regis Paper Company v. Bemis Company, Inc.*, 193 USPQ 8 (CA 7 1977); *Hofschneider Corp. v. Lane et al., doing business as Lane and Co.*, 71 USPQ 126 (DC WNY 1946).

Conclusion

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
Lin (6,426,556) and Lin et al. (6,426,281) each teaches a method of making a solder bump.
2. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Vikki Trinh whose telephone number is (703) 308-8238. The Examiner can normally be reached Mon-Tuesday, Thurs-Friday, 7:30 AM - 6:00 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Wael Fahmy, can be reached at (703) 308-4918. General inquiries relating to the status of this application should be directed to the Group receptionist at (703) 308-0858. The fax number is (703) 308-2708.

Vikki Trinh,
Patent Examiner
AU 2814



LONG PHAM
PRIMARY EXAMINER